

# Folkestone – Foord Valley

## £5.5m flood alleviation scheme after 1 in 600 years storm

**A** one in 600 year storm in August 1996 left shops and homes in Blackbull Road, in the Foord Valley area of Folkestone, under up to two metres of water. This flooding was due to a combination of inadequacies in the local water course (The Pent Stream), the highway drainage system and the combined sewerage system. There have been several other flooding events of less severity since the 1996 event and although there are only three DG5 properties in the area, many other properties have experienced flooding within their gardens and yards.



Condition of 1800 EPBM on completion of second drive (courtesy Southern Water).

The local Shepway District Council used its land drainage powers to address problems generated by the Pent Stream with the construction of a number of upstream balancing ponds and associated flow controls.

**Southern Water is currently addressing the problems associated with the public sewerage system with a £5.5 million flood alleviation scheme.**

The combined sewerage system in the Park Farm Industrial Estate and Retail Park is situated immediately upstream of Blackbull Road area and was found to be the principal source of the flows causing flooding.

### Problems

Following detailed hydraulic modelling of this catchment, it was determined that the preferred solution was the separation of the wastewater and surface water elements of the sewage flows. This would be achieved by converting the existing combined system to surface-water only and constructing a completely new wastewater system to serve the industrial estate and retail park.

During the Outline Design stage, impermeable area and connection surveys were carried out and it was found that it was impractical to completely separate flows. In particular, the construction of a new

wastewater system within the ‘Silver Spring’ factory would have involved severe disruption within this major producer of mineral water, with the consequential financial effects. Other local businesses would also be adversely affected. It was therefore accepted that the new system would be designed on a partially separate basis and that it would have to accept an element of surface water.

### Hydraulic modelling

Further hydraulic modelling showed that it would be necessary to reduce the pass forward rate from the new to the existing system and a flow control device and 700m<sup>3</sup> attenuation tank would be required immediately upstream of the connection point within the Park Farm Road allotments.

Flows from the combined system (which would now receive only surface water flows), were also to be intercepted within the allotments and transferred a distance of 956 metres to an existing 1.8m diameter low level surface water sewer situated in Cornwallis Avenue.

In early June 2002, a contract was awarded by Southern Water to *Mowlem Johnston Ltd* under IChemE ‘red book’ conditions of contract. Johnstons then proceeded with the detailed design and commenced construction in mid July.

The new partially separate system was constructed using a number



Confined working area in allotments (courtesy Southern Water).



Directional drilling in Park Farm Chase (courtesy Southern Water).



February rainfall -storage culvert site (courtesy Southern Water).



Removal of doggers - Cornwallis shaft (courtesy Southern Water).

of methods. Larger diameter pipelines (450mm to 675mm) and shallow small diameter laterals (100mm) were mostly constructed by traditional open-cut methods. The remainder of the pipelines (150mm to 375mm) were installed by directional drilling. This method had the important advantage of minimising disruption, when working within the busy industrial estate and retail park. This was particularly true at the point where the new pipeline passed under a roundabout, which forms the access to a large superstore, a DIY store and the main access into the industrial estate from the M20. The serious disruption and traffic delays, which would have resulted from open cut methods, were avoided by adopting the directional drilling approach. Recent developments in the equipment used to track the drill head position, resulted in very few problems with maintenance of line and level.

### 110,000 volt hazard

A major challenge faced while constructing the open cut sewers was the presence of the underground National Grid owned cross channel cable, which links the Sellindge Converter Station, near Ashford to Les Mandarins in France. This cable carries 110,000 volts DC and its presence, within one metre of the works at some locations, was a major consideration when developing method statement and risk assessments.

The storage tank has been constructed from culvert sections and is sited under allotments within Park Farm Road.

### Transfer pipeline

The surface water transfer pipeline was constructed by two separate pipejacking operations. This was carried out by *Johnston's Microtunnelling Division* and shaft sinking by *T & W Mechanical Headings*. The first 1.8m diameter pipe jack was driven from a thrust pit situated within school playing fields and consisted of two 330m long drives. The second 1.2m dia. pipe-jack was driven from a thrust pit and consisted of drives of 120m and 173m. Both drives were carried out using *Herrenknecht mixed face EPBM*.

The majority of the tunnelling was carried out within the Folkestone beds. The presence of rock bands, locally known as 'doggers', within these beds led to a large variation in rates of progress. Bands of clay were also encountered, requiring the machine to fully demonstrate its mixed face capabilities. The best progress recorded during a shift was 10 pipes, or 25 metres, but this was the exception with less than one metre being recorded on several occasions. The presence of a high water table added to the problems and extensive de-watering was required when sinking shafts to overcome a difficult combination of 'doggers' and running sand.

### Smaller works

The scheme, which is expected to be completed by July 2003, also includes a number of smaller works in other locations. These include a £420,000 scheme which transferred flows from two high level pipelines into a 10m deep low level trunk sewer tunnel. This work was completed by *Trant Construction* at the end of 2002. Further minor diversion works by Southern Water Term Contractor *ALS Ltd* are still in progress (May 2003).

Southern Water fast-tracked the scheme with the support of Foord Valley Residents Association, councillors, Michael Howard MP., and OFWAT. It was one of several high priority flood relief schemes on which the company has been working. The other schemes were at: Gosport; Hove; Bexhill; Worthing; Aylesford; Maidstone and Hythe. ■

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